

**REMARKS**

Entry of the foregoing, re-examination and reconsideration of the subject matter identified in caption, as amended, pursuant to and consistent with 37 C.F.R. §1.112, and in light of the remarks which follow, are respectfully requested.

Claims 37, 38, 42, 46, 53, 59, 67, 74 and 81 have been canceled without prejudice or disclaimer. New claims 106-135 have been added. The specification has been amended to correct the spelling of "quartz" and to update the status of the parent application. Claims 47, 48, 54, 55, 60-63, 68-70, 75-77 and 82-84 are drawn to non-elected subject matter and stand withdrawn from consideration on the merits.

New claims 106-135 find support throughout the specification and in the originally filed claims. Support for the new claims is set forth in the following Tables I and II:

**TABLE I**

<b>Features of New Claims</b>	<b>Support in the Specification</b>
A: Main crystals consist of enstatite and/or its solid solution	Page 22, lines 28-31
B: K <sub>2</sub> O content = 0.1-2 mol%	Page 20, line 35
C: Y <sub>2</sub> O <sub>3</sub> content = 0.3-10 mol%	Page 19, lines 5-7, 35-36
D: Al <sub>2</sub> O <sub>3</sub> content = 5-25 mol%	Page 16, lines 34-35
E: The content of Alkali metal oxides is 5 mol% or less	Page 20, lines 21-22
F: Ra is equal to or less than 1nm	Originally filed claim 37
G: Ra is equal to or less than 0.5nm	Originally filed claim 38
H: Light transparency at 600nm through the substrate with 1 mm thickness is equal to or more than 10%	Originally filed claim 42
I: Thermal expansion coefficient of the crystallized glass at 100 to 300°C is in the range of $65 \times 10^{-7}$ to $85 \times 10^{-7}/^{\circ}\text{C}$	Originally filed claim 46, Page 52, line 25
J: The crystallization degree of the crystallized glass is equal to or more than 50 vol%	Originally filed claim 53
K: The total content of enstatite and/or its solid solution ranges from 70 to 90 vol%, the content of titanate ranges from 10 to 30 vol%, and the sum of enstatite and/or its solid solution and titanate is equal to or more than 90 vol%	Originally filed claim 59
L: The crystallized glass is substantially free of spinel as a crystal phase	Originally filed claim 74
M: The crystallized glass is substantially free of ZnO	Originally filed claim 81

**TABLE II:**

Claim	Feature
Claim 106	A, D, E, F, I, M
Claim 107	A, C, D, E, F
Claim 108	A, B, D, E, F, M
Claim 109	Claim 106 + Feature (C)
Claim 110	Claim 106 + additional feature (supported by the Specification, page 16, line 35 to page 17, line 1)
Claim 111	Claim 107 + additional feature (supported by the Specification, page 16, line 35 to page 17, line 1)
Claim 112	Claim 108 + additional feature (supported by the Specification, page 16, line 35 to page 17, line 1)
Claim 113	Claim 106 + additional feature (supported by originally filed claim 63)
Claim 114	Claim 106 + additional features included in claims 110 and 113
Claim 115	Claim 106 + Feature (B)
Claim 116	Claim 107 + Feature (B)
Claim 117	Claim 106 + additional features (supported by originally filed claims 1 and 2, and in the Specification, page 20, line 4)
Claim 118	Claim 107 + additional features (supported by originally filed claims 1 and 2, and in the Specification, page 20, line 4)
Claim 119	Claim 108 + additional features (supported by originally filed claims 1 and 2, and in the Specification, page 20, line 4)
Claim 120	Claim 106 + additional features (supported by originally filed claims 1-3, and in the Specification, page 20, line 4)
Claim 121	Claim 107 + additional features (supported by originally filed claims 1-3, and in the Specification, page 20, line 4)
Claim 122	Claim 108 + additional features ( supported by originally filed claims 1-3, and in the Specification, page 20, line 4)

**TABLE II (Continued)**

Claim	Feature
Claim 123	Claim 107 + Feature (M)
Claim 124	Claim 106 + Feature (G)
Claim 125	Claim 107 + Feature (G)
Claim 126	Claim 108 + Feature (G)
Claim 127	Claim 106 + Feature (H)
Claim 128	Claim 107 + Feature (H)
Claim 129	Claim 108 + Feature (H)
Claim 130	Claim 106 + Features (J) and (K)
Claim 131	Claim 107 + Features (J) and (K)
Claim 132	Claim 108 + Features (J) and (K)
Claim 133	Claim 106 + Feature (L)
Claim 134	Claim 107 + Feature (L)
Claim 135	Claim 108 + Feature (L)

Applicant confirms the telephonic election of Group I, claims 37, 38, 42, 46, 53, 59, 67, 74 and 81, in a conference with Examiner Group on March 3, 2004.

Turning to the Office Action, claims 59 and 67 were rejected under 35 U.S.C. §112, second paragraph, for the reasons given in paragraph (2) of the Action. These claims have been canceled thereby rendering the rejection moot. The new claims are free of the objected-to terminology.

Claims 37, 42, 46, 67, 74 and 81 were rejected under 35 U.S.C. §102(a) or (e) as anticipated by U.S. Patent No. 6,245,411 to Goto et al. for the reasons given in paragraph (5) of the Office Action. Reconsideration of this rejection is requested in view of the above amendments and the reasons which follow.

Claims 37, 42, 46, 67, 74 and 81 have been canceled without prejudice or disclaimer. New independent claims 106-108 specify that the main crystals in the crystallized glass consist of enstatite and/or its solid solution. In contrast, Goto et al. '411 discloses a glass ceramic in which the predominant crystal phase, that is, the main crystals, is composed of cordierite and other crystals. Thus, the reference fails to disclose or suggest a glass ceramic where the main crystals consist of enstatite and/or its solid solution.

For at least these reasons, the rejection under §102 over Goto et al. '411 is inapplicable to new claims 106-135.

Claims 37, 38, 42, 46, 53, 59, 67, 79 and 81 were rejected under 35 U.S.C. §102(a) or (e) as anticipated by or, in the alternative, under 35 U.S.C. §103(a) as obvious over U.S. Patent No. 6,503,857 or 6,429,160 to Nakajima et al. The Examiner's reasons are set forth in paragraphs (6) and (7) of the Office Action.

The effective U.S. filing date of Nakajima et al. '857 and Nakajima et al. '160 is May 23, 2000. The present application claims the benefit pursuant to 35 U.S.C. §119, of Japanese Patent Application No. 293003/1999, which was filed on October 14, 1999, i.e. prior to the U.S. filing dates of the references.

Attached to the present Amendment is a copy of a certified English translation of Japanese Patent Application No. 293003/1999, which was submitted during prosecution of the parent application, Serial No. 09/610,687. Applicant believes the translation clearly discloses at least the features (A)-(G), (L) and (M) as set forth in Table I above.

Claim 106 includes the feature that the crystallized glass exhibits a thermal expansion coefficient at 100°-300°C in the range of  $65 \times 10^{-7}$  to  $85 \times 10^{-7}/^{\circ}\text{C}$ . Neither

of the cited Nakajima et al. patents discloses or suggests a glass ceramic having a thermal expansion coefficient as specified in claim 106. All the features specified in claim 107 are disclosed in priority Japanese Application No. 293003/1999 as verified in the translation. Claim 108 specifies that the K<sub>2</sub>O content ranges from 0.1 to 2 mol%. By maintaining the level of K<sub>2</sub>O within this range, it is possible to suppress the reduction of Young's modulus, lower the melting temperature of the glass, and minimize the Pt contamination from crucibles containing Pt by ionization (note page 20, lines 20-28) The glass ceramic substrates in Examples 1-3 and 6 of the Nakajima et al. patents which consist of enstatite as the main crystal do not contain K<sub>2</sub>O. Moreover, the presence of K<sub>2</sub>O is expressly avoided according to claim 3 of the references.

For at least the above reasons, the §102(a) and (e) and §103(a) rejections based on Nakajima et al. '857 or '160 are inapplicable to new claims 106-135.

Claims 37, 38, 42, 46, 53, 59, 67, 79 and 81 were further rejected under 35 U.S.C. §102(a) or (e) as anticipated by or, alternatively, under 35 U.S.C. §103(a) as obvious over U.S. Patent No. 6,344,423 to Goto et al. for the reasons provided in paragraph (8) of the Office Action. Reconsideration of these rejections is requested for at least the following reasons.

Goto et al. '423 does not disclose or suggest a glass ceramic substrate whose thermal expansion coefficient is as defined in claim 106. Claim 107 specifies that the substrate has a Y<sub>2</sub>O<sub>3</sub> content of 0.3 to 10 mol%, whereas Goto et al. '423 does not disclose or suggest the addition of Y<sub>2</sub>O<sub>3</sub>. Claim 108 specifies that the substrate has a K<sub>2</sub>O content of 0.1 to 2 mol%. In contrast, the glass substrates in the Examples of

Goto et al. '423 do not contain K<sub>2</sub>O. Also, claim 2 thereof expressly excludes the presence of K<sub>2</sub>O.

For at least these reasons, the §102 and §103 rejections over Goto et al. '423 are inapplicable to claims 106-135.

Claims 37, 38, 42, 46, 53, 59, 67, 79 and 81 stand rejected under 35 U.S.C. §102(a) or (e) as anticipated by or, alternatively, under 35 U.S.C. §103(a) as obvious over JP 11-278865 or JP 11-278864 for the reasons set forth in paragraph (9) of the Office Action. Reconsideration of these rejections is requested for at least the following reasons.

Claims 106 and 108 specify that the crystallized glass is substantially free of ZnO because the presence of ZnO facilitates the production of spinel hard crystals (specification on page 21, lines 32-35). The language "substantially free" means that the amount of any ZnO present is insufficient to facilitate the production of spinel hard crystals. The glasses disclosed in these Japanese documents include ZnO as an essential component. Claim 107 recites the presence of Y<sub>2</sub>O<sub>3</sub> in an amount of 0.3 to 10 mol%. The Japanese documents do not disclose or suggest adding Y<sub>2</sub>O<sub>3</sub> as an ingredient.

For at least these reasons, the §102(a) and (e) and §103(a) rejections based on JP 11-278864 or JP 11-278865 are inapplicable to claims 106-135.

Claims 37, 38, 42, 46, 53, 59, 67, 79 and 81 were rejected under 35 U.S.C. §102(a) as anticipated by JP 2000-169184 or JP 2000-69186 for the reasons given in paragraphs (11) and (12) of the Office Action. Reconsideration of these rejections is requested for at least the following reasons.

In claims 106-108, the Al<sub>2</sub>O<sub>3</sub> content of the substrate is in the range of 5 to 25 mol% and the content of alkali metal oxides is not more than 5 mol%. By contrast, the crystallized glass disclosed in JP 2000-169184 includes Li<sub>2</sub>O in an amount exceeding 10 mol% (see claim 1) and the crystallized glass in JP 2000-169186 includes Al<sub>2</sub>O<sub>3</sub> in an amount of less than 5 mol% (see claim 1).

For at least these reasons, the §102(a) rejections over JP 2000-169184 or JP 2000-169186 are inapplicable to claims 106-135.

Claims 37, 38, 42, 53, 74 and 81 were rejected under 35 U.S.C. §102(e) as anticipated by U.S. Patent No. 6,294,490 to Zou et al. for reasons set forth in paragraph (13) of the Office Action. Reconsideration of this rejection is requested for at least the following reasons.

Zou et al. '490 describe five aspects of their invention. The crystallized glasses of the first, second and third aspects comprise a quasi-stable quartz solid solution as a main crystal (see lines 40-47 of column 8; line 66 of column 10 to line 5 of column 11; lines 15 to 21 of column 14). That is, the main crystals of the crystallized glasses of these aspects do not consist of enstatite and/or its solid solution. The crystallized glasses of the fourth and fifth aspects include as a primary crystal phase, either or both of a quartz solid solution and an enstatite. However, there are no examples in Zou et al. '490 where the main crystals consist of enstatite and/or its solid solution (see the Tables in Zou et al. '490).

Furthermore, in claims 106 to 108, the content of alkali metal oxides is equal to or less than 5 mol%, while the crystallized glass of the fourth aspect comprises Li<sub>2</sub>O in an amount exceeding 10% (see lines 64-65 of column 15). Also, the Al<sub>2</sub>O<sub>3</sub> content defined in claims 106-108 is 5 to 25 mol%, while the crystallized glass of the

fifth aspect comprises Al<sub>2</sub>O<sub>3</sub> in an amount equal to or more than 0 mol% and less than 5 mol% (see lines 58-59 of column 5).

Accordingly, for at least these reasons, the §102(e) rejection over Zou et al. '490 is inapplicable to claims 106-135.

Claims 37, 38, 42, 53, 74 and 81 were rejected under 35 U.S.C. §102(e) as anticipated by U.S. Patent No. 6,627,565 to Zou et al. as set forth in paragraph (14) of the Office Action. Reconsideration of this rejection is requested for at least the following reasons.

In claims 106-108, the main crystals in the crystallized glass consist of enstatite and/or its solid solution. In contrast, in the crystallized glass substrate disclosed in Zou et al., the major crystalline phase comprises an α-quartz solution and enstatite and/or its solid solution. Thus, an α-quartz solution is not present in the main crystals of the presently claimed substrates.

For at least these reasons, the §102(e) rejection over Zou et al. '565 is inapplicable to claims 106-135.

Claims 37, 38, 42, 53, 74 and 81 were rejected on the ground of obviousness-type double patenting over claims 1-33 of U.S. Patent No. 6,627,565 and over claims 1-13 of U.S. Patent No. 6,294,490. Also, claims 37, 38, 42, 46, 53, 59, 67, 79 and 81 were rejected on the ground of obviousness-type double patenting over claims 1-21 of U.S. Patent No. 6,627,566. The Examiner's rationale for these rejections is provided in paragraphs (16), (17) and (18) of the Office Action. Reconsideration of these rejections is requested for at least the following reasons.

New claims 106-135 are believed to be patentably distinct from the claims of the '565, '490 and '566 patents for at least the reasons provided above in connection

with the prior art rejections. If claims 106-135 are otherwise allowable, Applicant would consider filing terminal disclaimers to expedite prosecution.

From the foregoing, further and favorable action in the form of a Notice of Allowance is believed to be next in order and such action is earnestly solicited. If there are any questions concerning this paper or the application in general, the Examiner is invited to telephone the undersigned at (703) 838-6683 at his earliest convenience.

Respectfully submitted,

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